## CLAIMS

What is claimed is:

1. A method for determining a rate of rain falling on a surface wherein the rain causes vibrations of the surface, said method comprising the steps of:

sensing the vibrations of the surface;

generating a vibration signal proportional to the vibrations of the surface, wherein the vibration signal includes peaks;

determining the peaks of the vibration signal;

determining time intervals between the peaks;

counting a number $n_1$ of time intervals that occur between a first time and a second time and that fall in a first range of the time intervals;

counting a number $n_2$ of time intervals that occur between the second time and a third time and that fall in a second range of the time intervals; and

determining the rain rate $\lambda$ with an equation derived from a point process equation and utilizing $n_1$ and $n_2$.

2. A method as set forth in claim 1 further comprising the step of maintaining the first range and the second range of time intervals equal in a time span w.

3. A method as set forth in claim 2 wherein the step of determining the rain rate $\lambda$ with the derivative of the point process equation utilizing $n_1$ and $n_2$ is further defined as determining an intermediate rain rate $\lambda_{int}$ with an equation $\lambda_{int} = 2\cdot(n_2 - n_1) / w\cdot(n_2 + n_1)$.

4. A method as set forth in claim 3 further comprising the step of successively determining the intermediate rain rate $\lambda_{int}$.

5. A method as set forth in claim 4 further comprising the step of averaging the intermediate rain rates $\lambda_{int}$ to determine the rain rate $\lambda$.

6. A method as set forth in claim 1 wherein the first range of the time intervals is further defined as all time intervals less than or equal to the second time, the second range of the time intervals is further defined as all time intervals greater than the second time, and the step of determining a rain rate $\lambda$ with the derivative of the point process equation utilizing $n_1$ and $n_2$ is further defined as determining the rain rate $\lambda$ with an equation $\lambda = n_1 / n_2$.

7. A method as set forth in claim 1 wherein the first range of the time intervals is further defined as all time intervals less than or equal to the second time, the second range of the time intervals is further defined as all time intervals greater than the second time, and the step of determining a rain rate $\lambda$ with the derivative of the point process equation utilizing $n_1$ and $n_2$ is further defined as determining the rain rate $\lambda$ with an equation $\lambda = n_1 / (T \cdot n_2)$, wherein T represents the second time.

8. A method as set forth in claim 1 further comprising the step of generating a series of digital values that are representative of the vibration signal, each digital value having a magnitude component and a time component.

9. A method as set forth in claim 8 further comprising the step of modifying the magnitude components of the digital values to enhance the peaks of the vibration signal.

10. A method as set forth in claim 9 wherein the step of modifying the magnitude components comprises the step of detecting a first magnitude v(n–1), a second magnitude v(n), and a third magnitude v(n+1).

11. A method as set forth in claim 10 wherein the step of modifying the magnitude components further comprises the step of computing an enhanced magnitude $v_e(n)$ with an equation $v_e(n) = v^2(n) - A \cdot v(n-1) \cdot v(n+1)$, wherein A is a scaling number selected to maximize the enhancement of peaks.

12. A method as set forth in claim 11 wherein the step of modifying the magnitude components further comprises the step of successively determining enhanced magnitudes $v_e(n)$ to provide an enhanced series of digital values, each enhanced digital value having an enhanced magnitude component and the time component.

13. A method as set forth in claim 12 wherein the step of determining the peaks of the vibration signal comprises the step of sorting the enhanced series of digital values by the magnitude component of each enhanced digital value.

14. A method as set forth in claim 13 wherein the step of determining the peaks of the vibration signal further comprises the step of discarding all digital values with magnitude components that are not greater than a certain threshold from the enhanced series of digital values.

15. A method as set forth in claim 14 further comprising the step of varying the certain threshold based on a size of droplets of rain.

16. A method as set forth in claim 14 wherein the step of determining the peaks of the vibration signal further comprises the step of determining a largest enhanced magnitude in the enhanced series of digital values to identify a valid peak.

17. A method as set forth in claim 16 wherein the step of determining the peaks of the vibration signal further comprises the step of determining a next largest enhanced magnitude component in the enhanced series of digital values that is a set time apart from the largest enhanced magnitude component to identify another valid peak.

18. A method as set forth in claim 17 wherein the step of determining the peaks of the vibration signal further comprises the step of successively determining the next largest enhanced magnitude component in the enhanced series of digital values that is a set time apart from any of the valid peaks to identify additional valid peaks.

19. A method as set forth in claim 8 wherein the step of determining the peaks of the vibration signal further comprises the step of analyzing each digital value as the digital value is generated from the digital signal to determine if the magnitude component of the digital value exceeds a certain threshold.

20. A method as set forth in claim 18 wherein the step of determining the peaks of the vibration signal further comprises the step of identifying a valid peak when the magnitude component of the digital value first exceeds the certain threshold.

21. A method as set forth in claim 19 wherein the step of determining the peaks of the vibration signal further comprises the step of starting a timer to run for a certain time when the magnitude component of the digital value exceeds the certain threshold for preventing the identification of valid peaks while the timer is running.

22. A method as set forth in claim 20 further comprising the step of varying the certain threshold based on a size of droplets of rain.

23. A method as set forth in claim 12 wherein the step of determining the peaks of the vibration signal further comprises the step of analyzing each enhanced digital value as the enhanced digital value is generated to determine if the magnitude component of the enhanced digital value exceeds a certain threshold.

24. A method as set forth in claim 18 wherein the step of determining the peaks of the vibration signal further comprises the step of identifying a valid peak when the magnitude component of the enhanced digital value first exceeds the certain threshold.

25. A method as set forth in claim 19 wherein the step of determining the peaks of the vibration signal further comprises the step of starting a timer to run for a certain time when the magnitude component of the enhanced digital value exceeds the certain threshold for preventing the identification of valid peaks while the timer is running.

26. A method as set forth in claim 20 further comprising the step of varying the certain threshold based on a size of droplets of rain.

27. A method as set forth in claim 1 further comprising the step of producing a rain signal in response to the determined rain rate $\lambda$.

28. A method as set forth in claim 27 further comprising the step of actuating at least one wiper in response to the rain signal to remove rain from the surface.

29. A method as set forth in claim 28 wherein the wiper actuates at a frequency and the method further comprising the step of modifying the rain signal based on the frequency and the rain rate.

30. A method for determining a rate of rain falling on a surface wherein the rain causes vibrations of the surface, said method comprising the steps of:

sensing the vibrations of the surface;

generating a vibration signal proportional to the vibrations of the surface, wherein the vibration signal includes peaks;

determining the peaks of the vibration signal;

determining time intervals between the peaks; and

determining the rain rate $\lambda$ with an equation derived from principles of a point process.